"Slowed Rotor/Compound" Vertical Takeoff and Landing Personal Air Vehicle, Phase I

Completed Technology Project (2004 - 2005)

Project Introduction

slowed rotor / compound (SL/C) aircraft offer VTOL combined with fixed-wing flight-efficiencies. They are safer than any other type aircraft -- with much lower acquisition, maintenance and operational cost than helicopters and tiltrotors. Carter Aviation Technologies began developing SL/C aircraft in 1994 and began flying a prototype, the CarterCopter Technology Demonstrator (CCTD) in 1998. This proposal, using CCTD data, will provide a prototype 2-seat SR/C, VTOL aircraft that meets NASA?s PAVE goals. Reduced community noise is provided by a computerized propeller, designed for quietness, which operates at low tip-speeds and is protected by tail-booms. The non-stalling autorotating rotor provides low tip-speeds, eliminates the helicopter ?dead man zone? and provides the equivalent of an emergency parachute. Low cost per seat mile is provided by simplified construction, reduced parts count and high flight-efficiency. During VTOL and low-speed flight, SR/C aircraft fly like an autogyro having the same hp to weight ratio. Autogyros are the easiest aircraft to learn to fly safely. Pilot workload is simplified by an automated tilting pylon that keeps the wings in best L/D, an automated boosted collective and automated rotor flapping controls. The landing gear absorbs 24 ft/sec impacts. Only the tilting pylon is untested.

Anticipated Benefits

the SR/C PAV can be made roadable by using 3 wheel motorcycle rules. Its 24-ft rotor is locked fore & aft with red ?oversize load? flags on the ends. The main wheels provide 50 mph highway speeds via a simple variable speed drive and differential. VTOL combined with the autorotating rotor?s ?safety parachute? negates problems of other roadable PAVs and provides a viable option to helicopters and fixed-wing aircraft. Fast-build kits for a VTOL 4- seat, 1000 mile, 200 mph roadable SR/C PAV would cost $55,000 (less engine and avionics) if 500-1000 built per year. Fast-build RV10 kits now costs $45,000. Carter SR/C aircraft technology is fully scalable by design. It has application for safe, low-cost VTOL 200 mph PAVs having a 1000 mile range for rural, regional and intra-urban on-demand transportation as envisioned by the NASA SATS program. The same technology can be applied equally to micro-unmanned aerial vehicles (UAV) and huge intercontinental transport aircraft. The global market for UAVs of all sizes is large and rapidly growing ? yet currently there are very few flight-efficient UAVs having VTOL abilities. An appropriately designed Carter SR/C UAV with VTOL would be ideal for long-range exploration on Mars.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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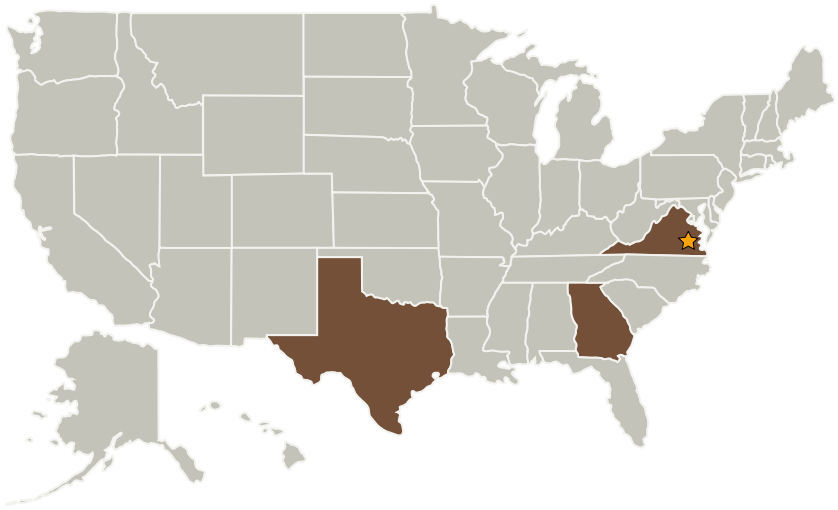
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Carter Aviation Technologies	Supporting Organization	Industry	Wichita Falls, Texas
Georgia Tech Research Corporation	Supporting Organization	Academia	Atlanta, Georgia

Primary U.S. Work Locations	
Georgia	Texas
Virginia	

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Mark D Moore

Principal Investigator:
Jay Carter

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.6 Advanced Atmospheric Flight Vehicles